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10/529,645

12/05/2005

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EXAMINER

JANAKIRAMAN, NITHYA

ART UNIT

PAPER NUMBER

2123

NOTIFICATION DATE

DELIVERY MODE

03/25/2010

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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| | | | |
|------------------------------|---------------------------------------|-------------------------------------|--|
| Office Action Summary | Application No. 10/529,645 | Applicant(s) MIURA ET AL. | |
| | Examiner NITHYA JANAKIRAMAN | Art Unit 2123 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 December 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,5,9 and 10 is/are rejected.
- 7) ☒ Claim(s) 3,4,6-8 and 11-18 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 March 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This action is in response to the submission filed on 12/22/2009. Claims 1-18 are presented for examination.

Response to Arguments- 35 USC § 103

1. Applicant's arguments filed 12/22/09 have been fully considered but they are not persuasive.
2. **Note: the previous 103 rejection contains a typo which refers to a Kuragano reference. The 103 rejection of record was intended to be Krishnamurthy, in view of Bronskill, further in view of Moreton. Because all citations in the rejected claims were explicitly given from these three references, and only these references, and the motivation statement does not refer anywhere to Kuragano. Also, it appears that applicant recognized that the rejection was based upon Moreton due to the arguments presented on pages 15-16. Therefore this action is not made Non-Final.

Argument 1:

3. Applicant argues on page 12 that Bronskill's tangent and normal vectors are only in two-dimensional space, whereas claim 1 requires computing coefficients in three-dimensional space.
4. Bronskill is only used to teach first order differential values of the mesh point. Both Krishnamurthy (*column 6, lines 10-15: "...scanned 3-dimensional data. In this case, the input is a dense, unparameterized polygon mesh..."*) and Moreton (*column 4, lines 24-32: "...displays of two-dimensional and three-dimensional objects..."*) involve the generation of three-dimensional space and three-dimensional curvature.

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Argument 2:

5. Applicant argues on page 12 that Bronskill is only related to the “field of digital drawing” and not to “a CAD system”, and thus is not analogous art.

6. The Examiner requests an explanation as to how a Computer Aided Design system could not possibly be in the same field of art as "digital drawing". Computer Aided Design *is* digital drawing, and is the field of computer generated imagery and graphics.

Argument 3:

7. Applicant argues on page 13 that Krishnamurthy cannot be relied upon for a memory device because it does not generate the first and second order differential values.

8. Krishnamurthy is being used in this instance to teach the limitation of a memory device. Bronskill and Moreton are used to generate the information that is stored in Krishnamurthy. See below for a statement of obviousness to combine.

Argument 4:

9. Applicant argues on pages 14-15 that all three references are based on plane geometry in a two-dimensional space in contrast to surface geometry in a three-dimensional space.

10. As stated above, both Krishnamurthy (*column 6, lines 10-15: “...scanned 3-dimensional data. In this case, the input is a dense, unparameterized polygon mesh...”*) and Moreton (*column 4, lines 24-32: “...displays of two-dimensional and three-dimensional objects...”*) involve the generation of three-dimensional space and three-dimensional curvature. Only Bronskill is directed towards two-dimensional curves, and is only used for the teaching of first order differential values.

11. Argument 5:

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12. Applicant argues on pages 15-16 that Moreton does not teach both first-order differential values as well as second-order differential values.

13. Moreton is only being used for the teaching of second-order differential values of the mesh point and a normal vector of the mesh at the mesh point (*Moreton: column 12, lines 7-34; column 14, lines 14-21; column 18, lines 5-30*).

Allowable Subject Matter

14. Claims 2-4, 6-8, and 11-18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

15. Krishnamurthy, Bronskill, and Kuragano all teach a computer aided design system which computes a principal curvature of mesh. However, these references and the remaining prior art of record in combination with the remaining elements and features of the claimed invention, fails to disclose or suggest “features of said curved surface, said five feature quantities comprising a Gaussian curvature and a mean curvature computed based on said principal curvature, said principal direction, said line of curvature, and said coefficients of the first fundamental form and said coefficients of the second fundamental form” (claims 2, 6). Nor do they teach “wherein, in a case where a mesh point of the mesh is represented by $S(u, v)$, the coefficients of the first fundamental form at the mesh point represented by $S(u, v)$ are E , F and G , such that the coefficients E , F and G are represented by the followings equations:

$$E = Su^2;$$

$$F = Su \times Sv; \text{ and}$$

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$$G = Sv^2, \text{ and}$$

wherein $Su = \partial s / \partial u$ and $Sv = \partial s / \partial v$ " (claims 11, 13, 15, 17).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

17. Claims 1, 5, 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,256,038 ("Krishnamurthy") in view of US 6,201,549 ("Bronskill"), in view of US 5,636,338 ("Moreton").

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18. Krishnamurthy teaches a computer aided design system for designing curved surfaces. However, Krishnamurthy does not teach defining tangent and normal vectors to the curved mesh surface.
19. Bronskill does teach these limitations (*see Figure 8*).
20. Krishnamurthy and Bronskill are analogous art because they are both related to the field of CAD design.
21. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the tangent and normal vectors of Bronskill with the CAD system for curved surfaces of Krishnamurthy, motivated by the desire to produce “highly realistic...images” (*Bronskill: column 9, lines 60-67*).
22. Krishnamurthy and Bronskill teach a computer aided design system, but do not teach a second-order differential value of the mesh point
23. Moreton does teach this (*see column 12, lines 7-34; column 14, lines 14-21; column 18, lines 5-30*).
24. Krishnamurthy, Bronskill and Moreton are all analogous at as they are related to the field of CAD design.
25. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the second-order differential value of Moreton with the CAD system of Krishnamurthy and Bronskill, motivated by the desire to “designing curves, networks of curves, and curved surfaces for use by a computer to perform an analysis or to subsequently display or to toll a curved object (*see Moreton, column 1, lines 6-11*).

26. Regarding claims 1, 5, 9 and 10, Krishnamurthy, Bronskill and Moreton teach:

A computer aided design system (*Krishnamurthy: column 2, lines 28-44*) comprising:

a point sequence information extraction device which extracts a plurality of point sequences on a curved surface (*Krishnamurthy: column 6, lines 39-59 “approximation mesh points”; column 8, lines 6-34, “face-point curve”*);

a dividing device which generates a curved surface from the point sequences using another computer aided design system, and divides the curved surface into a mesh having a predetermined number of mesh points (*Krishnamurthy: column 8, lines 6-34, “polygon mesh”, “face-point curve”*);

a first fundamental form computing device for computing coefficients of a first fundamental form at a mesh point of the mesh, the coefficients of the first fundamental form being defined at the mesh point by a first order differential values of the mesh point (*Bronskill: Figure 8, column 6, lines 10-24, “tangent vector”, “normal vector”*);

a second fundamental form computing device for computing coefficients of a second fundamental form at the mesh point, the coefficients of the second fundamental form being defined at the mesh point by a product of a second-order differential values of the mesh point and a normal vector of the mesh at the mesh point (*Moreton: column 12, lines 7-34; column 14, lines 14-21; column 18, lines 5-30*); and

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a memory device which stores the point sequence information, the coefficients of the first fundamental form and the coefficients of the second fundamental form (*Krishnamurthy: column 2, lines 28-44, "computer implemented method"*).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NITHYA JANAKIRAMAN whose telephone number is (571)270-1003. The examiner can normally be reached on Monday-Thursday, 8:00am-5:00pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached on (571)272-3753. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nithya Janakiraman/
Examiner, Art Unit 2123

/Paul L Rodriguez/
Supervisory Patent Examiner, Art Unit 2123